
United States
Department of
Agriculture
National Agricultural Library

Atrazine in Surface Waters

A Report of the Atrazine Task Group to the
Working Group on Water Quality

April 1992

Working Group on Water Quality
Ad hoc Atrazine Task Groups

MEMBERS

POLICY WORK GROUP

D. Bucks, ARS

G. Grubbs, EPA/OW

J. Bushnell, ES

P. Patterson, SCS

J. Wood, APHIS

C. Rumburg, CSRS

J. Roelofs, EPA/OPP

D. Rickert, USGS

T. Browning, ASCS

M. Ribaudo, ERS

F. Swader, WGWQ

J. Meek, WGWQ

L. Adams, WGWQ

PROGRAM WORK GROUP

J. Antognini, ARS

A. Havinga, EPA/OCWDW

C. Landers, SCS

P. Yasnowsky, ASCS

J. Wood, APHIS

W. Wheeler, CSRS/NAPIAP

B. Lowery, CSRS

H. Jacoby, EPA/OPP

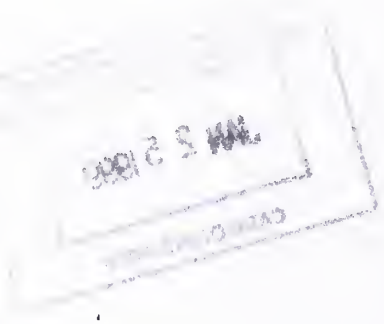
H. Mattraw, USGS

A. Weinberg, EPA/OW

J. Bushnell, ES

J. Parochetti, CSRS

F. Swader, WGWQ



ATRAZINE IN SURFACE WATERS

USDA Working Group on WATER QUALITY

Atrazine Task Group April 1992

INTRODUCTION

In February 1989, the President's Initiative on Water Quality proposed a vigorous national effort to protect groundwater and surface waters from contamination by agricultural chemicals and wastes, especially pesticides and nutrients.

Named the lead agency in the Initiative, the USDA developed a Water Quality Program to "minimize the risk of contaminating groundwater and surface waters with agricultural chemicals." The Working Group on Water Quality (WGWQ) is an interdepartmental group established to carry out this program. It includes 12 USDA agencies, along with the U.S. Geological Survey (USGS); the U.S. Environmental Protection Agency (EPA); the National Oceanic and Atmospheric Administration (NOAA); the U.S. Army Corps of Engineers; the Fish and Wildlife Service; and the Tennessee Valley Authority (TVA).

As another part of the President's Initiative, the USGS monitored the Mississippi River and some of its tributaries to determine the presence, levels, and variability of selected pesticides in the water. They found that 1) increased concentrations of dissolved atrazine occur in the river system for 4 to 6 weeks following corn planting; 2) the concentrations of dissolved atrazine vary by as much as one order of magnitude above "background" levels; 3) increased levels are associated with rainfall; 4) individual elevations ("spikes") are relatively short-lived; and 5) levels occasionally exceed three parts per billion (ppb).

It should be noted that "background levels," generally, are in the range of 0.5 ppb or less; that some observed spikes have exceeded 12 ppb; and that the fate of atrazine spikes has not been studied with regard to their dilution during movement in rivers.

The WGWQ coordinated the Water Quality Initiative response to this documented presence of dissolved atrazine in surface water through an *ad hoc* task group of USDA, USGS, and EPA staff. The task group worked to develop a realistic assessment of the problem and an appropriate reaction -- a process that can serve as a model for coordinated interagency responses to similar future challenges.

SCOPE OF RESPONSE

The WGWQ response to the atrazine findings is based on the EPA's current established Maximum Contaminant Level (MCL) and the presence of atrazine spikes in the Mississippi River and some of its tributaries. It takes into consideration the implications of the seasonal variations of atrazine levels; the ability of public water suppliers to comply with the Safe Drinking Water Act; and the perceptions and concerns of the general public. The study area includes the States of Nebraska, Kansas, Missouri, Illinois, Iowa, and Indiana.

ISSUE

This report addresses the issue of what more the cooperating agencies should do, under the President's Initiative, to monitor the presence of atrazine and other agricultural chemicals; to reduce the loadings and concentrations of atrazine in surface waters, especially in the Corn Belt; and to provide information to the public and to farmers. Is there a clear need for **new programs** or **program changes** to reduce seasonal increases in atrazine concentrations in surface waters?

CURRENT SITUATION

Atrazine use

Atrazine was registered by Ciba-Geigy in 1958, and first marketed to U.S. farmers in 1959. It is applied as a pre-emergence and early post-emergence herbicide to control broadleaf and grassy weeds. Most of the atrazine (80 percent) is used for corn production.

In 1990, an estimated 33 million pounds of atrazine were used in the 6 states in the study area. The average rate of application on cropland was 1.13 pounds per acre (lb/A). Use rates varied from 0.5 lb/A for post-emergence applications, to about 1.75 lb/A for pre-emergence uses.

The number of treated cropland acres has not changed, but the amount of atrazine applied has dropped by about 20 percent over the last 8 years. Lower application rates, the use of other herbicides in combination with atrazine, prescription weed control, more stringent state requirements, and increased grower awareness of the potential for water contamination are factors in this reduction. Some surveys project a dramatic shift toward post-emergence herbicides, suggesting that by 1996 they will account for 62 percent of dealer-applied herbicides.

The USDA Conservation Reserve Program has removed 8.8 million acres of highly erodible lands from active cropping in the geographic area of concern. This should contribute to reduced atrazine loadings; but we cannot estimate the magnitude of these reductions.

A USDA study (1986) estimated that the loss of atrazine for corn production would cause an annual economic loss of $780 million. There are a number of registered herbicides for use on corn, but they do not control the same spectrum of weeds, nor are they as effective as atrazine.

Regulatory Framework

Two federal laws -- the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the Safe Drinking Water Act (SDWA)-- and their respective regulations are relevant to this matter. FIFRA established the EPA as the lead agency in regulating pesticides,and gave the EPA-approved label the force of law.

Under the SDWA, the EPA's National Primary Drinking Water Regulations define a public water system as "not in compliance" if the concentration of any contaminant at any sampling point is greater than the EPA-established MCL.

Under the SDWA, the EPA's National Primary Drinking Water Regulations define a public water system as "not in compliance" if the concentration of any contaminant at any sampling point is greater than the EPA-established MCL.

The MCL for atrazine was promulgated by EPA on January 30, 1991, and becomes effective on July 30, 1992. Public water suppliers are required to begin monitoring finished drinking water for atrazine beginning January 1993. One-third of suppliers must begin to sample in 1993, a second third in 1994, and the final third in 1995. However, EPA encourages public water suppliers using surface water in areas where atrazine is used to begin sampling early. All public water systems must meet compliance requirements by July 1996.

The MCL for atrazine in drinking water is currently an **annual average** value of 3 parts per billion (ppb), based on a minimum of four quarterly samples. Though a single sample may exceed 3 ppb, a water system remains in compliance with federal regulations until the annual average concentration of atrazine exceeds 3 ppb. EPA considers the annual average to be an appropriate indicator of the long-term exposure and risk.

With the minimal quarterly sampling regime, if a single quarterly sample exceeds 12 ppb -- or if any two quarterly samples exceed 6 ppb in one year -- the system will be out of compliance, even if the remaining samples contain no contamination. EPA has said that they cannot determine whether water suppliers in the USGS survey areas are likely to exceed MCL's until the full year's worth of samples are collected.

Occurrence Data

-- The USGS analyzed surface water samples from 149 sites in 122 river basins in the midwestern U.S. They were collected during a harvest phase (October and November, 1989); a pre-planting phase (March and April 1990); and a post-planting phase (May and June 1990). These data indicated that "large concentrations of herbicides were flushed from croplands and were transported through the surface-water system as pulses in response to late spring and early summer rainfall." Median concentrations of atrazine increased by one order of magnitude and then decreased to near pre-planting levels by harvest sampling.

About 50 percent of the sampling sites had concentrations of dissolved atrazine in excess of 3 ppb. Such elevated levels of atrazine were associated with rainfall and subsequent runoffs. During the first runoff following atrazine application, 29 percent of the samples had atrazine concentrations greater than 12 ppb.

-- In November, 1991, the USGS released monitoring data from the Mississippi River and some of its tributaries for the period of April, May, and June 1991. Concentrations of dissolved atrazine above 3 ppb were sustained for 4-6 weeks from about mid-May to mid- or late June in the lower Platte River in Nebraska, the lower White River in Indiana, the lower Illinois River in Illinois, and the lower Missouri River in Missouri.

About 80 percent of the detections above 3 ppb fell between 3.0 and 6.0 ppb. About 20 percent occurred at levels above 6.0 ppb. Detections in the upper Mississippi River (at Clinton, IA) were all below 3 ppb. The highest concentration occurred in the Platte River at Louisville, NE -- 10 ppb on June 7. Subsequent data from this site (through August 1991) included only two additional spikes of 3 ppb and 2.6 ppb. Since a full year of monitoring has not yet been concluded, annual average values cannot be determined.

-- The Missouri River Public Water Supplies Association monitored pesticide concentrations from May through July 1991 in the Platte River in Nebraska; the Kansas River in Kansas; and the Grand, Chariton, Osage, and Gasconade Rivers in Missouri. Average atrazine concentrations ranged from 0.7-3.2 ppb, and maximums ranged from 6.7-11.1 ppb.

-- Dr. David Baker (Heidelberg College, Tiffin, OH) conducted detailed and long-term studies of pesticide concentrations in the Maumee and Sandusky Rivers of Ohio. The rivers drain 6,313 and 1,251 square miles, respectively, of intensive row crop agriculture, and also serve as water sources for public water supplies. His data indicate that while monthly average atrazine concentrations during May, June, and July exceed 3 ppb, even the highest observed annual average concentrations were below 3 ppb.

The relationships among the sampling sites and water treatment intakes were not specified for the foregoing data. The lack of such information raises questions about the validity of direct or implicit extrapolation of such data to water intake sites or to treated drinking water.

Some lakes and reservoirs also exhibit fluctuations in atrazine concentrations. Since these levels persist longer than they do in actively flowing rivers, violations of the MCL appear to be more likely in drinking water from these sources than in drinking water from river supplies. The number of such sources has not been determined.

UNCERTAINTIES

Besides the uncertainties about the scope and the intensity of the atrazine problem and the likelihood of MCL violations, there are other important information needs.

-- While increased levels of dissolved atrazine, and discrete atrazine spikes can be expected in rivers following the planting season, available data do not allow confident predictions of the annual average concentrations in drinking water supplies. A legitimate quarterly test schedule could, conceivably, not include the 4-6 week period of peak atrazine concentrations. If it did include sampling during that period, the presence of a significant atrazine spike at the specific time and place of sampling would be a random, rainfall-related event.

-- The specific nature of an atrazine spike is unknown. Characterization of the time-concentration relationships (the "hydrograph") of some spikes is essential for developing management strategies. Intensive monitoring during the anticipated peak season at strategic locations is would document the frequency, duration, and magnitude of the spikes. Their apparent transient nature, and the generally low background concentrations of dissolved atrazine, make the magnitude and duration of the spikes a direct concern.

-- Because there are few data for comparison, any trends in the magnitude of the general levels of dissolved atrazine in streams immediately after the corn planting season are unknown. It appears that the general elevations are unlikely to be high enough to cause violations of the MCL.

-- The practicality of predicting the occurrence and movement of atrazine spikes and taking appropriate action at water treatment intake sites has not been explored. Currently employed technology - the use of powdered activated charcoal for taste and odor control - sometimes reduces atrazine levels in drinking water.

-- The impact of the withdrawal of atrazine for industrial weed control is not predictable. The cessation of the use of one million lbs/yr sold for this purpose -- and used at application rates of 10 lbs/A on landscapes engineered for rapid drainage -- may have a some impact on atrazine spikes in rivers.

-- EPA is assessing additional health-effects data. The dietary NOEL ("no observable effect level") is being reassessed.

IMPLICATIONS

Water Safety:

In conjunction with the release of the USGS study on the EPA issued a set of "Questions and Answers." Selected items include the following:

> While the study indicates that public water suppliers in the affected areas should be aware of atrazine and alachlor, we do not believe that there is an immediate or serious health threat posed by these herbicides in the Mississippi River and tributaries for the following reasons:

This survey was of ambient surface water, not of finished, treated drinking water. Drinking water levels may be somewhat lower, depending on blending with uncontaminated water or treatment currently in place. Granular activated carbon has been shown to be effective in removing atrazine and alachlor from water.

The MCL's for atrazine (3 ug/L)* and alachlor (2 ug/L) are based on a risk over a lifetime of exposure, and also include a margin for public safety. Occasional or short-term exposure to levels slightly exceeding the MCL are not believed to pose a serious health risk. EPA does not believe the levels found in the survey pose an acute or short-term health risk to people drinking the water.

Future EPA Actions:

EPA is concerned by USGS's findings of widespread contamination of the Mississippi River system with herbicides. Just last year, EPA approved a number of restrictions on the use of atrazine, the most frequently detected herbicide, aimed at reducing the likelihood of ground and surface water contamination. . . Apparently, these measures have not been sufficient to prevent extensive contamination of surface water. Although EPA does not believe that the measured levels indicate an imminent health risk, EPA is requesting that registrants propose additional interim risk reduction measures. The agency will closely examine the results of the USGS study and other data to determine if additional regulatory measures are needed.

Water Supply

The American Water Works Association (AWWA) has raised questions about atrazine with the EPA and with several Congressional committees. They foresee the need for costly procedures to remove atrazine from drinking water if the MCL is exceeded. They point out that there are limited resources available in communities and water supply agencies to comply with Safe Drinking Water Act regulations.

Granulated activated charcoal filters are the only prescribed and recognized technology for removing atrazine from drinking water. Most supply systems do not have such filters, and they will be expensive to build and maintain. It is not at all obvious that such filters, even if required, would be needed on a year-round basis, or that all of the water processed during the peak atrazine-concentration periods would require such filtration.

Powdered activated charcoal, added during the treatment process, could also remove some dissolved atrazine, and may be an effective short-term treatment alternative. However, its use decreases a water treatment plant's capacity and increases the problem of disposal of flocculated sludges.

* Editors note: Three micrograms per liter (3 ug/L) are equivalent to three parts per billion (3 ppb).

Agriculture

In response to public concerns, Minnesota, Wisconsin, Iowa, and Kansas have instituted, or are considering, stricter-than-label requirements for the agricultural use of atrazine. The Kansas restrictions are due to concern about concentrations in surface waters; the others are designed to protect groundwater.

The entire situation has serious implications for agriculture. Atrazine is the most widely used herbicide in corn production in the United States. It controls a wide range of broadleaf and grassy weeds and has been an important component of "conservation tillage" and "no-till" corn production systems. It also plays an important role in meeting the goals of the Farm Bill's "conservation compliance" provision, which was intended to reduce soil erosion and consequent sediment loads (and their adsorbed agricultural chemicals) to the Nation's surface waters.

These conflicting concerns suggest the need for a holistic assessment of the risks associated with the atrazine use relative to the risks associated with soil erosion and sediment loadings, or the risks to public health, and the need for careful prioritization of water quality programs to insure that they address high risk, high priority problems.

The most serious implication for the USDA revolves around the advisability of making major changes in current agricultural practices based on potential future problems. It is not clear that MCL's will be exceeded in finished drinking water from river supplies. It is likely that some changes in atrazine application practices would reduce the levels of dissolved atrazine in runoff waters; such changes already are being encouraged and implemented in a number of states.

PRINCIPALS AND THEIR CONCERNS

The American Water Works Association (AWWA) is concerned about the expense of compliance with the SDWA regulations; possible public anger over higher water costs; and negative public reactions should even temporary non-compliance occur. The AWWA seeks assurances that peak levels of atrazine in rivers will not cause violations of the drinking water MCL, or that regulatory relief or financial assistance will help their members meet compliance requirements. In the absence of such assurances, they would support a ban on the use of atrazine.

The Ciba-Geigy Corp., the principal manufacturer of atrazine, is naturally concerned about possible undesirable publicity and unwarranted restrictions on atrazine use. They contend that the use of appropriate best management practices (BMP's) by farmers will keep atrazine levels in drinking water low enough to meet the SDWA requirements for nearly all water treatment facilities, and they support the establishment of atrazine management areas under state authority for those areas where BMP's are insufficient.

In addition, they have voluntarily withdrawn atrazine as an industrial weed control and have made label changes that reduce application rates, eliminate fall application, and designate atrazine as a restricted-use pesticide. Additional label changes to deal with surface water concerns have been accepted by EPA, and will become effective for the 1993 planting season.

The EPA indicates that there is a strong possibility of additional regulatory actions being taken on atrazine registrations. They are concerned that USDA programs do not recognize or adequately address the problem of atrazine in surface waters used as public water supplies. In response to an EPA request, the registrants who manufacture and sell atrazine have agreed to develop additional data to better address its hazards and exposures, including any carcinogenic potential.

The USGS has continued to monitor water quality in the Mississippi River and its tributaries. These data will be interpreted and reported to provide a realistic estimate of average annual concentrations of atrazine in those surface waters.

The USDA has coordinated this response process to explore the need for redirecting Water Quality programs or activities to address the issue of pesticides in surface water. While the available data do not clearly substantiate the need for broad additional programs or projects, the USDA is concerned about the levels of dissolved atrazine in drinking water supplies.

PRINCIPAL AGENCIES AND THEIR PROGRAMS

Under the President's Initiative on Water Quality, current programs and projects of the USDA, USGS, and EPA are already addressing many aspects of pesticide management. In addition, new cooperative projects such as the Integrated Farm Management Systems program are being planned.

USGS

-- The USGS is cooperating with the Management System Evaluation Areas (MSEA's) in Ohio, Minnesota, Iowa, Missouri, and Nebraska. The USGS role is to characterize the hydrogeologic framework for the MSEA studies, and conduct research on the fate and transport of agrichemicals.

-- The USGS Toxic Substances Hydrology Program has supported regional scale projects in the transport of herbicides in the atmosphere, surface-water drainage system, and the surficial aquifer throughout the Corn Belt.

-- The USGS National Water Quality Assessment (NAWQA) program is working with USDA's National Agricultural Statistics Service (NASS) and Economic Research Service (ERS) to develop accurate chemical use information for the eight Area Studies throughout the United States. These data will be compared to herbicide migration through various environmental components.

EPA

-- The EPA and USDA are jointly developing an Agricultural Pollution Prevention Strategy that sets targets and monitors program successes in reaching agricultural pollution prevention goals.

-- The Non-point Source Program provides funding under the Clean Water Act for states to carry out agriculture-related activities that include technical assistance, educational programs, enforcement mechanisms, and cost-share assistance for demonstration projects.

-- The Public Water Supply Program provides technical assistance and training to drinking water producers regarding agriculture-associated chemicals.

-- Under the "Pesticides and Groundwater Strategy," EPA offers technical and financial assistance to states for developing plans that promote management of pesticide use based on each state's unique hydrological and agricultural characteristics.

-- Other EPA programs provide support for installing agricultural BMP's in selected watersheds where agricultural activities contribute to water pollution problems in rivers, lakes, estuaries, and coastal waters.

USDA

-- The USDA has a number of ongoing programs such as Integrated Pest Management, Pesticide Applicator Training, and Integrated Crop Management that address various aspects of water quality.

In addition, USDA agencies promote a wide range of farm management practices that reduce surface runoff. Such practices, along with changes in herbicide application techniques, can also reduce atrazine use and -- probably -- atrazine concentrations in surface water.

-- Under the National Agricultural Pesticide Impact Assessment Program, the USDA is developing a biological and economic assessment of atrazine and the impact of its potential loss as an agricultural production input.

-- The USDA has begun an in-depth study of atrazine/surface water interactions that will provide the basis for a policy review.

-- The Conservation Reserve Program to retire "highly erodible lands" has removed an estimated 8.8 million acres from crop production in the geographic areas of most direct concern. Since they are highly vulnerable to surface runoff, the removal of those acres which were in corn production (usually with atrazine as the principal herbicide) should produce commensurate reductions in atrazine loading to surface waters. The available data do not allow confident predictions of the magnitude of such reductions. Shifts in cropping on other cropland may also impact potential reductions in atrazine loadings.

-- Sixteen USDA Demonstration Projects have begun under the President's Initiative. The projects in Nebraska and Iowa are directly relevant to the matter of atrazine in surface water, and those in Minnesota and Michigan will provide supplementary information.

-- There are five USDA Management System Evaluation (research) Areas (MSEA's) within the Corn Belt. Those of particular relevance are in Iowa (three locations), Missouri, and Nebraska. The MSEA's in Minnesota and Ohio will contribute supporting information. The USGS is an active cooperator in the MSEA projects.

-- Seventy-four USDA Hydrologic Unit Areas (HUA's) have been initiated. There are nine HUA's in the six states of primary concern. Six of these address surface water and pesticides, while three focus on groundwater protection.

-- Seventy-four USDA Water Quality Special Projects (WQSP's) have been initiated. There are nine WQSP's in the six states being studied. Six of these deal with the quality of surface waters, and of those, three list chemicals or pesticides as matters of concern.

-- USDA agencies have established joint research programs with the State Agricultural Experiment Stations to better understand the impacts of agricultural production systems on water quality, and to develop agricultural systems that are both economically and environmentally beneficial. Special research grants have been made under the President's Initiative -- a total of 113 over the past 3 years. Of these, nine are in the six states of concern. In addition, 11 research projects have been funded in these same states under the MSEA program.

-- The USDA's Area Study Program is designed to provide chemical use and farming practice information to aid in understanding the relationships among farming activities, soil properties, and water quality. NASS will interview farm operators in 12 major watersheds where USGS is measuring the quality of surface and groundwater resources under its NAWQA Program. ERS will use this information to assess the magnitude of the agriculture-related water quality problem for the nation as a whole, and to evaluate the potential economic and environmental effects if the Initiative were implemented nationwide.

Two of the 1991 studies (the Central Nebraska Basin and the White River in Indiana) and two of the 1992 studies (the Lower Illinois River Basin and the Eastern Iowa Basins) will provide information that is directly applicable to problem areas.

PROGRAM OPTIONS

The interagency atrazine task force considered a number of responses to the atrazine situation -- ranging from one extreme (do nothing) to the other (mount a massive national effort). They selected three options for further consideration: (1) to continue discussions and allow consequent

changes to occur; (2) to develop a deliberate, incremental response; and (3) to create an "atrazine strike force" to respond visibly and swiftly to problems.

The Working Group on Water Quality recommended option (2): to develop a deliberate, incremental response in a Plan of Action -- with the **additional** feature of a proactive group, rather than a problem-driven "strike force." The presently constituted atrazine task group should continue its role as that proactive group.

Under the attached Plan of Action, the Initiative's program committees -- Research and Development (R&D); Education, Technical and Financial Assistance (ET&FA); and Data Base and Evaluation (DB&E) -- are the logical groups to plan and implement programs or activities for those areas where atrazine levels in surface and groundwater resources are likely to lead to violations of the MCL. These committees include representatives from EPA, USGS, TVA and NOAA, as well as 12 USDA agencies. The response should identify opportunities for each of the relevant agencies.

PLAN OF ACTION

Predications

This plan of action recognizes that:

* While incidences of MCL exceedences will create public concern (which must be addressed), perceived problems can create as much difficulty as documented problems.
* While the USDA's Water Quality Initiative programs are relevant to this issue, states must help identify the scope and intensity of specific problems and the nature of appropriate responses. Responses must be sensitive to location-specific conditions.
* While cooperating federal agencies will use their existing mechanisms to provide assistance, more data are needed to specify the scope and intensity of the problem.
* While immediate dramatic changes are not likely to occur (atrazine has been used for over 30 years), water quality monitoring will be required to document the impact of specific programs.
* While atrazine is the specific focus of this proposed response, the process can be used for other issues as well.

Timetable

The specified dates will facilitate the implementation of programs to affect the 1993 season. The impact should be measurable on a project scale in 5 years or less, but the likely year-to-year variations associated with rainfall will necessitate a rigorous program of water quality monitoring and interpretation.

Action

1. Communicating urgency

Cooperating agencies will request field staff and state cooperators to review program impacts on atrazine runoff with a sense of urgency and to actively participate in developing timely assessments and programs for farm management practices.

2. Examining solutions

The R&D Committee will provide leadership to review the situation and to identify potential program adjustments. These will be developed with cooperators from the affected states and representatives from the ET&FA and DB&E committees.

In early April, 1992, the R&D committee convened a meeting of selected professionals from a representative sample of states to discuss:

* the state perspective on atrazine in drinking water;
* the availability of atrazine efficacy data and its implications for reducing application rates;
* the situation with regard to alternative application methods; and
* a preliminary identification of potential "hotspots."

3. Transferring Technology

Based on the results of the R&D meeting, the ET&FA Committee will convene, by mid-summer, a meeting or meetings of state-level action agency representatives and selected state officials to review, on a selective basis, the dimensions of the problem of atrazine in surface

water and drinking water; the location of known or suspected "hotspots;" the need for new and/or redirected activities to address the issue; and the necessary steps to implement such activities. Possible adjustments might include:

* review of processes for selecting farm management practices;
* refocusing of current water quality projects;
* re-evaluation of current herbicide usage recommendations;
* increased emphasis on crop rotation, conservation tillage, and residue management;
* the adoption of new chemical application technology;
* the legitimization of recommendations of less-than-label rates of application; and
* the need for additional technology transfer conferences.

These meetings could facilitate state responses such as workshops, on-farm demonstrations, modification of management practices, and other education, technical, and financial assistance efforts.

4. Evaluating Progress

To assist in program changes for FY 93, the DB&E Committee will, by November 1, 1992, prepare a report evaluating the progress of activities in the Plan of Action. Information will be drawn largely from MSEA's and Demonstration Projects, HUA's, Area Studies, and USGS and EPA research projects. The report will address current atrazine use estimates, water quality monitoring information (including studies conducted by USGS), estimated farmer effects and adjustments, and EPA, USDA, and USGS program concurrence with tasks described in the Plan of Action.

The DB&E Committee will continue to develop appropriate baseline data necessary to estimate agricultural atrazine use. Atrazine use estimates will be reported to the WGWQ on an annual basis no later than June of each year. The DB&E Committee will coordinate subsequent evaluations, conducted by agreement among the participating agencies, to quantify the effects of Water Quality Initiative programs.

5. Coordinating Programs

The Executive Secretariat will continue to coordinate the program committees, monitor new water quality data, convene meetings of the atrazine task group, and report to the Working Group on Water Quality.

Conclusion

This coordinated response will ensure that the states give appropriate attention to atrazine and other agricultural chemicals; that the best technology is readily available to farmers; and that informed and considered decisions are made in the adoption of management practices. It will also build greater awareness of environmental considerations in the use of agricultural chemicals and in farm management, and will contribute to the intent of the Presidents Initiative.

###